


IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Carol W. Readhead and Robert Winston
 Serial No. Unassigned
 Filed: November 12, 2001
 For: IN VITRO TRANSFECTION, STORAGE AND TRANSFER OF
 MALE GERM CELLS FOR GENERATION OF TRANSGENIC
 SPECIES

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION
 Assistant Commissioner for Patents
 Washington, D.C. 20231

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Dear Sir or Madam:

This Preliminary Amendment is filed with a divisional application of pending U.S. Serial No. 09/191,920, filed November 13, 1999. The divisional application filed herewith is directed to the subject matter of Claims 78-96 and 131-132, as originally filed in parent U.S. Serial No. 09/191,920, which claims were designated Group III in a restriction requirement, mailed March 24, 2000. The Examiner is respectfully requested to consider the following amendments and remarks.

AMENDMENT

A Version With Markings To Show Changes Made is included beginning at page 7, after Applicant's Remarks.

IN THE SPECIFICATION:

In the Title, at page 1, lines 1-3, please delete the entire title, and insert therefor:

--IN VITRO TRANSFECTION, STORAGE AND TRANSFER OF MALE GERM CELLS
 FOR GENERATION OF TRANSGENIC SPECIES--.

At page 1, line 4, please delete the entire one-sentence paragraph, and insert the following:

--This application is a division of U.S. Non-provisional Application No. 09/191,920, filed on November 13, 1998, which claims the benefit of U.S. Provisional Application No.

60/065825, filed on November 14, 1997. This application is also related to U.S. Serial No._____, filed on November 12, 2001, U.S. Serial No._____, filed on November 12, 2001, and U.S. Serial No._____, filed on November 12, 2001, which are all divisions of U.S. Serial No. 09/191,920. This application is also related to U.S. Serial No. 09/272,443, filed March 19, 1999, which is a continuation of 09/191,920.--.

At page 4, line 14 through page 15, line 1, please delete the entire paragraph, and insert therefor the following:

--This invention also relates to a novel method for the isolation of spermatogonia, comprising obtaining spermatogonia from a mixed population of testicular cells by extruding the cells from the seminiferous tubules and gentle enzymatic disaggregation. The spermatogonia or stem cells which are to be genetically modified, may be isolated from a mixed cell population by a novel method including the utilization of a promoter sequence, which is only active in cycling spermatogonia stem cell populations, for example, b-Myb or a spermatogonia specific promoter, such as the c-kit promoter region, c-raf-1 promoter, ATM (ataxia-telangiectasia) promoter, RBM (ribosome binding motif) promoter, DAZ (deleted in azoospermia) promoter, XRCC-1 promoter, HSP 90 (heat shock gene) promoter, or FRMI (from fragile X site) promoter, optionally linked to a reporter construct, for example, the Green Fluorescent Protein Gene (EGFP). These unique promoter sequences drive the expression of the reporter construct only in the cycling spermatogonia. The spermatogonia, thus, are the only cells in the mixed population which will express the reporter construct and they, thus, may be isolated on this basis. In the case of the green fluorescent reporter construct, the cells may be sorted with the aid of, for example, a FACs scanner set at the appropriate wavelength or they may be selected by chemical methods.--.

At page 10, lines 11-17, please delete the entire paragraph and insert therefor the following:

--"Gene delivery (or transfection) mixture", in the context of this patent, means selected genetic material together with an appropriate vector mixed, for example, with an effective amount of lipid transfecting agent. The amount of each component of the mixture is chosen so that the transfection of a specific species of germ cell is optimized. Such optimization requires no more than routine experimentation. The ratio of DNA to lipid is

broad, preferably about 1: 1, although other proportions may also be utilized depending on the type of lipid agent and the DNA utilized. This proportion is not crucial.--.

At page 20, lines 15-22, please delete the entire paragraph and insert therefor the following:

--The GFP DNA-transferrin-polylysine viral complexes, prepared as described in Example 4 above, were delivered into the seminiferous tubules of three (3)-week-old B6D2F1 male mice. The DNA delivery by transferrin receptor-mediated endocytosis is described by Schmidt et al. and Wagner et al. (Schmidt et al., Cell 4: 41-51 (1986); Wagner, E., et al. PNAS (1990), (USA) 81: 3410-3414 (1990)). In addition, this delivery system relies on the capacity of adenoviruses to disrupt cell vesicles, such as endosomes and release the contents entrapped therein. The transfection efficiency of this system is almost 2,000 fold higher than lipofection.--.

IN THE CLAIMS:

Please cancel Claims 1-134, without prejudice, as originally filed with parent application 09/191,920, and add the following new Claims 135-155 as being directed to the subject matter of designated claim Group III, which is herein elected.

--135.(New) An in vitro method of incorporating at least one polynucleotide encoding a desired trait into a male germ cell, comprising

obtaining a male germ cell from a non-human vertebrate, said germ cell being selected from the group consisting of spermatogonial stem cells, type B spermatogonia, primary spermatocytes, preleptotene spermatocytes, leptotene spermatocytes, zygotene spermatocytes, pachytene spermatocytes, secondary spermatocytes, spermatids, and spermatozoa;

transfecting the germ cell in vitro with at least one polynucleotide encoding a gene product in operable linkage with a promoter, in the presence of a gene delivery mixture comprising at least one transfecting agent, and optionally a polynucleotide encoding a genetic selection marker; and

allowing the polynucleotide encoding a gene product to be taken up by, and released into the germ cell.

136.(New) The method of Claim 135, further comprising allowing the incorporation of the released polynucleotide into the genome of the germ cell.

137.(New) The method of Claim 135, wherein the male germ cell is a spermatogonial cell or other undifferentiated male germ cell.

138.(New) The method of Claim 135, wherein the transfection is conducted under conditions of temperature of about 25°C to about 38°C.

139.(New) The method of Claim 135, wherein the transfecting agent is selected from the group consisting of liposomes, viral vectors, and other uptake enhancing DNA segments, or comprises a mixture of any members of said group.

140.(New) The method of Claim 139, wherein the viral vector is selected from the group consisting of retroviral vectors, adenoviral vectors, transferrin-polylysine enhanced adenoviral vectors, Moloney murine leukemia virus-derived vectors, mumps vectors, and virus-derived DNAs that enhance polynucleotide uptake by and release into the cytoplasm of germ cells, or an operative fragment of- or mixture of any members of said group.

141.(New) The method of Claim 140, wherein the retroviral vector is selected from the group consisting of lentiviral vectors.

142.(New) The method of Claim 135, wherein the transfecting agent comprises an adenovirus vector having endosomal lytic activity, and the polynucleotide encoding a gene product is operatively linked to the vector.

143.(New) The method of Claim 135, wherein the polynucleotide encoding a gene product is in the form of a complex with a viral vector.

144.(New) The method of Claim 135, wherein the transfecting agent comprises a lipid transfecting agent.

145.(New) The method of Claim 135, wherein the transfecting agent further comprises an agent selected from the group consisting of a c-kit ligand and at least one genetic selection marker; and

the method further comprises isolating or selecting a male germ cell carrying at least one polynucleotide encoding a gene product and at least one polynucleotide encoding a genetic selection marker, from a donor male vertebrate with the aid of the genetic selection marker.

146.(New) The method of Claim 145, wherein the genetic selection marker comprises a gene expressing a detectable product, driven by a spermatogonia-specific promoter selected from the group consisting of c-kit promoter, b-Myb promoter, c-raf-1 promoter, ATM (ataxia-telangiectasia) promoter, RBM (ribosome binding motif) promoter, DAZ (deleted in azoospermia) promoter, XRCC-1 promoter, HSP 90 (heat shock gene) promoter, and FRMI (from fragile X site) promoter.

147.(New) The method of Claim 135, wherein the non-human vertebrate is a mammal.

148.(New) The method of Claim 147, wherein the mammal is selected from the group consisting of non-human primates and farm and marine mammals.

149.(New) The method of Claim 135, wherein the polynucleotide encoding a gene product is derived from the same non-human vertebrate species as the germ cell.

150.(New) The method of Claim 135, wherein the non-human vertebrate is selected from the group consisting of wild and domesticated vertebrates.

151.(New) The method of Claim 135, wherein the polynucleotide encoding a gene product is derived from a non-human mammal selected from the group consisting of human and non-human primates, canines, felines, swines, farm mammals, pachyderms, marine mammals, equines, murine, ovine and bovine, or from a bird selected from the group consisting of ducks, geese, turkeys and chickens.

152.(New) The method of Claim 151, wherein the polynucleotide is derived from a human.

153.(New) The method of Claim 135, wherein the promoter a germ cell-specific promoter.

154.(New) The method of Claim 135, wherein the polynucleotide encoding a genetic selection marker is operatively linked to a germ cell-specific promoter.

155.(New) The method of Claim 145, wherein the polynucleotide encoding a genetic selection marker is operatively linked to a germ cell-specific promoter.--.

REMARKS

Applicant's Preliminary Amendment is submitted together with a divisional application directed to the subject matter Claims 78-96 and 131-132, as originally filed in pending parent U.S. Serial No. 09/191,920, which claims were designated Group III in a restriction requirement, mailed March 24, 2000.

The amendment of the title (at page 1, lines 1-3), is to bring these into conformity with the new Claims 135-155.

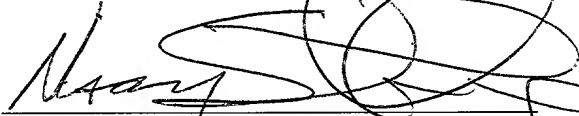
Applicant believes that no new matter is introduced by any amendments made herein.

At page 1, line 4, Applicant has added continuing data explaining the relationship to U.S. Serial No. 09/191,920 and other divisions and continuations thereof.

Applicant's cancellation of Claims 1-134 is made without prejudice. New Claims 135-155 are added. Support is found, e.g., in Claims 78-96 and 131-132, as originally filed.

Respectfully submitted,

Respectfully submitted,


Nisan A. Steinberg, Ph.D.
Registration No. 40,345

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**IN THE SPECIFICATION:**

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